

River Corridor Closure Contract

300 Area D4 Project Building Completion Report October 31, 2014, through End of River Corridor Closure Contract

February 2016



For Public Release

Washington Closure Hanford





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DOCUMENT CONTROL Mlc 2/22/2016

WCH-612 Rev. 1

STANDARD APPROVAL PAGE

Title:

300 Area D4 Project Building Completion Report October 31, 2014, through

End of River Corridor Closure Contract

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C. D. McCurley

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REVISION HISTORY

Revision	Date	Reason for revision	Revision initiator
1	02/2016	Revised to account for two additional mobile offices dispositioned after issuance of this building completion report.	CDM
0	05/2015	Initial issuance	CPS

METRIC CONVERSION CHART

Into Metric Units			Out	of Metric Units	5
If You Know	Multiply By	To Get	If You Know	Multiply By	To Get
Length			Length		
inches	25.4	millimeters	millimeters	0.039	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.621	miles
Area			Area		
Sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			Mass (weight)		
ounces	28.35	grams	grams	0.035	ounces
pounds	0.454	kilograms	kilograms	2.205	pounds
Ton	0.907	metric ton	metric ton	1.102	ton
Volume			Volume		
teaspoons	5	milliliters	milliliters	0.033	fluid ounces
tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
cups	0.24	liters	liters	0.264	gallons
pints	0.47	liters	cubic meters	35.315	cubic feet
quarts	0.95	liters	cubic meters	1.308	cubic yards
gallons	3.8	liters	,		
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			Temperature		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			Radioactivity		
picocuries	37	millibecquerel	millibecquerels	0.027	picocuries

1.0 SCOPE

This report summarizes the deactivation, decontamination, decommissioning, and demolition (D4) activities of the final available surplus facilities in the 300 Area of the Hanford Site by the end of the River Corridor Contract. D4 completion for the 309 Building, Mobile Office 391 (MO-391) and MO-868 occurred from October 31, 2014, through June 2015 (a 19-month period referred to herein as the "reporting period"). Completion of D4 for facilities associated with the 324 Building will extend beyond the River Corridor Closure Contract. The facilities included in this reporting period are the:

- 309 SP-100 Ground Engineering System Test Facility
- MO-391
- MO-868.

Lifecycle D4 of these facilities included characterization; engineering; removal of hazardous materials; removal or stabilization of radiologically contaminated materials; equipment removal; utility disconnection; deactivation, decontamination, and demolition of the structure; and stabilization (in-place) or removal of slabs and foundations.

As reference, previous D4 building completion reports include the following:

- WCH-41, 300 Area D4 Project 1st Quarter Fiscal Year 2006 Building Completion Report
- WCH-94, 300 Area D4 Project 2nd Quarter Fiscal Year 2006 Building Completion Report
- WCH-116, 300 Area D4 Project 3rd Quarter Fiscal Year 2006 Building Completion Report
- WCH-143, 300 Area D4 Project 4th Quarter Fiscal Year 2006 Building Completion Report
- WCH-309, 300 Area D4 Project Fiscal Year 2007 Building Completion Report
- WCH-310, 300 Area D4 Project Fiscal Year 2008 Building Completion Report
- WCH-374, 300 Area D4 Project Fiscal Year 2009 Building Completion Report
- WCH-447, 300 Area D4 Project Fiscal Year 2010 Building Completion Report
- WCH-504, 300 Area D4 Project Fiscal Year 2011 Building Completion Report
- WCH-558, 300 Area D4 Project Fiscal Year 2012 Building Completion Report
- WCH-566, 300 Area D4 Project Fiscal Year 2013 Building Completion Report
- WCH-608, 300 Area D4 Building Completion Report October 1, 2013 through October 31, 2014.

2.0 FACILITY DESCRIPTIONS AND CONDITIONS

The buildings detailed in this report were located in the 300 Area of the Hanford Site, which is owned and operated by the U.S. Department of Energy (DOE), in Benton County, Washington. The 300 Area was constructed and operated as a reactor fuel fabrication, research, and development complex.

2.1 309 SP-100 GROUND ENGINEERING SYSTEM TEST FACILITY

The 309 SP-100 GES Test Facility, better known as the Plutonium Recycle Test Reactor (PRTR), was located in the south-central portion of the 300 Area and was a 300 Area landmark with its distinctive round dome (Figure 1). The 309 complex included the PRTR containment vessel, its connected wings and annexes, the associated below-grade vaults, and the main exhaust stack. Constructed in 1960, the 309 PRTR was operated in support of the Plutonium Utilization Program to develop an optimum reactor fuel design for recycling plutonium to stretch the uranium fuel supply for commercial nuclear reactors. In 1965, during a test, a pre-defected fuel element failed resulting in the spread of contamination throughout the reactor and containment building. Six months were required to decontaminate the reactor and operating area. The PRTR restarted in July 1966 and operated until mid-1968 when it was shut down.

Layup and decommissioning occurred between 1969 and 1975. In 1975, the Interim Examination and Maintenance cell was built in the west wing of the 309 Building as an exact "cold" replica of the operating cell in the Fast Flux Test Facility reactor. The Interim Examination and Maintenance cell was used to train and requalify operators and to check operating procedures.

In 1986 to 1987, a new space technology development program known as the SP-100 was assigned to the 309 Building. The implementation of the program involved an extensive cleanout of the old PRTR facilities. In 1991 the program was placed on a 5-year hold and subsequently terminated in November 1993, which brought about the transition of the facility for deactivation.

Above-grade demolition of the 309 Building began in August 2010 and was completed in March 2014. Below-grade demolition began in December 2012 and was completed in January 2015. During this reporting period, several noteworthy D4 activities occurred: the remaining below-grade structure was removed from zero elevation to -32 ft, and holdup tanks TW-1, TW-2, TW-3, and the associated Retired Radioactive Waste Sewer/Radioactive Liquid Waste Sewer piping were removed within the excavation layback. Additional ancillary structures removed with the 309 Building include:

- Rupture Loop Annex
- Fuel Storage Basin
- Critical Test Facility
- Ion Exchange Vaults
- South Annex
- East Annex.

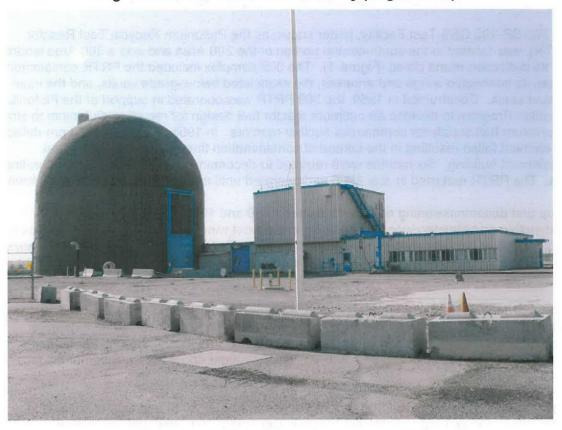


Figure 1. 309 SP-100 GES Test Facility (August 2006).

2.2 MOBILE OFFICE 391 (MO-391)

The MO-391 trailer (Figure 2) was a single-wide transportable mobile office constructed of sheet metal with wood walls and roof on a steel frame. It encompassed approximately 256 ft². From 2005 to 2012 it provided office and laboratory space in the 300 Area southeast of the 324 Building, east of the 309 Building, and north of the 3709-A Building. Finally, it was used as a field support storage trailer in the parking lot southwest of the 325 Building until May 14, 2015, when it was transported to the Environmental Restoration Disposal Facility (ERDF). It was disposed of in the ERDF on June 3, 2015.



Figure 2. Mobile Office 391 (August 2009).

2.3 MOBILE OFFICE 868 (MO-868)

The MO-868 Trailer (Figure 3) was a single-wide transportable facility. Typical mobile office construction consisted of sheet metal with wood walls and roof on a steel frame. It encompassed approximately 265 ft². The MO-868 Trailer was first located at the 100-N Area in 2005 and was used as a radiological count room and later as a change trailer. The trailer was relocated to the 300 Area in 2014 where it was located in the 300 Area parking lot southwest of the 325 Building. The trailer supported 300 Area Industrial Hygiene personnel until it was transported to the ERDF on June 23, 2015, for disposal.



Figure 3. Mobile Office 868 (June 2006).

3.0 PROJECT ACTIVITIES

3.1 ENGINEERING AND PERMITS

The Removal Action Work Plan for 300 Area Facilities (DOE/RL-2004-77) and the Removal Action Work Plan for River Corridor General Decommissioning Activities (DOE/RL-2010-34) were prepared to satisfy the requirements of the action memoranda, outlining how compliance with and enforcement of applicable regulations will be achieved for cleanup of 300 Area facilities. Additionally, the removal action work plans and 300 Area Facilities D4 Environmental Control Plan (WCH-84) serve as the decommissioning plan and project management plan for the 300 Area project. The removal action work plan was prepared in accordance with Section 7.2.4 of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) (Ecology et al. 1989) and was approved by the DOE, Richland Operations Office and the U.S. Environmental Protection Agency.

Plant Forces Work Reviews (PFWR) were prepared for the demolition of the facility to determine whether *Davis-Bacon Act of 1931* prevailing wage rates for the work were applicable.

Table 1 summarizes the review performed. The D4 work on the building was determined to be "not applicable" and the work was performed by plant forces. Part of the determination in PFWR 8850-059-06, Rev. 2 was that portions of the 309 slabs and below grade structures were to be left in place to protect associated waste sites and later to be removed as part of the waste sites scope. The portions for slabs and below-grade structures left in place were removed as part of the work scope covered in PFWR 8850-016-07 Rev. 0 as "applicable" work during the process of remediating waste sites 300-22 and UPR-300-5.

Table 1. Plant Forces Work Reviews.

Building	PFWR Number	PFWR Title
309	8850-059-06	Demolition of Various 300 Area Building
300-22, UPR-300-5	8850-016-07	300-FF-2 Remaining OU Waste Sites
MO-391	N/A	N/A
MO-868	N/A	N/A

PFWR = Plant Forces Work Review

N/A = not available

A criticality screening for the 309 Building was performed and showed that fissionable material inventories did not exceed threshold activity values and no criticality safety requirements or controls were needed for the building. The building was categorized as below Hazard Category 3 based on DOE Standard Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports (DOE-STD-1027-92). Table 2 identifies the 309 Building hazard categorization document.

The quantity of nonradioactive hazardous substances did not exceed the threshold quantities (20 Code of Federal Regulations [CFR] 1910.119, "Chemical Accident Prevention Provisions," or 40 CFR 68.130, "Occupational Safety and Health Standards").

Table 2. Hazard Categorization Evaluations and Results.

Facility	IHC/FHC Number	IHC/FHC Category
309	IHC-2006-0013	Below Category 3

IHC = Initial Hazard Categorization

3.2 HAZARDOUS MATERIAL REMOVAL

The scope of the demolition project included removing and properly disposing of hazardous materials (e.g., oils, grease, asbestos-containing material, mercury, lead, and PCBs). All known hazardous materials were removed from inside and outside of the buildings to the extent practical prior to demolition. Some hazardous materials may have remained in the 309 building during demolition (e.g., lead shielding embedded in concrete). In certain cases, some asbestos-containing material (e.g., roofing material, floor tile, and vinyl sheeting) was left in place during demolition as allowed by regulation. In this case, all 309 building demolition waste was treated

as asbestos waste, and controls to minimize asbestos fiber release (e.g., fixatives, wet methods, and air monitoring) were used when necessary through the demolition process.

3.3 RADIOLOGICAL CONTAMINATION STABILIZATION

Extensive radiological characterization/scoping survey were performed prior to demolition. Any loose/residual contamination on building surfaces, in/on piping and ducting, and in/on equipment was fixed in place to prevent the spread of contamination during demolition. High-activity and highly contaminated structures and equipment (e.g., reactor core and piping) were removed prior to demolition.

3.4 UTILITY AND DRAIN ISOLATION

Once the utilities were no longer needed to support building operations, and prior to hazardous materials removal, all electrical, water, sewer, and telecommunications services were disconnected from the buildings. Floor drains were sealed to provide isolation.

3.5 DEMOLITION OF ABOVE-GRADE STRUCTURES

In general, after the hazardous materials and equipment removal activities were performed and utilities isolated, the above-grade structure was ready for demolition. The 309 building structure was demolished using excavator-mounted hydraulic shears and a bucket-and-thumb. The stack was felled with explosives then size reduced for loading and disposal. Standard ERDF roll-on/roll-off containers with 6-mil liners were used to package and ship debris. Large items (e.g., reactor core, cover blocks, moderator tank, TW-3 tank) were shipped to ERDF in special packaging on low-boy trailers or Goldhofer modular heavy duty transport vehicles.

The mobile offices (MO-391 and MO-868) were transported intact to the ERDF where they were disposed.

3.6 BELOW-GRADE DEMOLITION AND SITE RESTORATION

The 309 Building was demolished to the -32 foot elevation with the remaining primary containment structure left in place. All other below-grade structures associated with 309 were entirely removed. DOE and EPA concurrence was obtained prior to leaving the remaining primary containment structure. The as left condition of the 309 building is documented in the Facility Status Change Form D4-300-102, available in the Administrative Record. The as left conditions of MO-391 and MO-868 are documented in Facility Status Change Forms D4-300-104 and D4-300-103, respectively.

Table 3 summarizes the as-left conditions at the building sites.

Table 3. Facility As-Left Condition Summary.

Building	Slab/Below-Grade Condition	Site Posting
309	The lower primary containment structure remains from -32 foot elevation. The excavation remains open and backfill will be performed as part of adjacent waste site remediation.	The lower primary containment structure is posted as a radiological contamination area.
MO-391	Trailer area was left undisturbed.	No postings
MO-898	Trailer area was left undisturbed.	No postings

4.0 COST AND SCHEDULE

Table 4 details life-cycle costs for the major activities associated with 309 D4 as well as the total labor costs. These costs do not include deactivation or surveillance and maintenance work performed by Fluor Hanford; Bechtel Hanford, Inc.; and other contractors prior to turnover of the building to WCH. They also do not include overhead or distributed costs, equipment and material costs, or incidental work performed by subcontractors.

Table 4. 309 Building Cost Summary.

Activity	Hours	Cost
Planning and Documentation	4,848	714,111
Deactivation and Decommissioning	27,846	1,520,513
Demolition Above-Grade	114,049	30,490,661
Demolition Below-Grade	59,690	7,589,487
Load-Out	11,456	594,046
Transition/Final Closure	781	71,258
TOTALS	218,670	40,980,076

Note that figures represent life-cycle totals for all 309 D4 activities, some of which began prior to the current reporting year. The total labor cost (before overhead and distributed costs) for 309 was \$40,980,076.

For MO-391 and MO-868, costs were for transportation intact to ERDF where they were disposed. Transport of MO-391 was \$3,823 and transport of MO-868 was \$3,633.

5.0 WASTE DISPOSITION

One of the objectives of the 300 Area D4/Waste Sites Project is to support recycling and waste minimization. However, beryllium and radiological contamination throughout the site prevents most of the material and equipment from being salvaged and/or transferred offsite. Unless

noted in Section 2.0, all of the building debris identified in this report was shipped to ERDF for disposal.

Waste generated from demolition of the 309 Building during this reporting period was characterized under waste profiles and shipped to ERDF. Roll-on/roll-off boxes were used to ship the debris other than large single-piece components as noted in 3.5. The life-cycle total number of shipments ("cans") and tons of debris disposed of in ERDF, and the profiles used are listed in Table 5.

Facility	Number of Shipments	Tons	Waste Profile(s)
309 PRTR	7,010	132,960	WP309001, WP309003, WP309MOD001, WP309PRTR003, WP309DUCT001, WP309FEC003, WP309MOD001, WP309PROC003, WP309SRCS001, WP309TW3003
MO-391	1	3.5	WP300NR001, Rev. 13
MO-868	1	~4	WP300NR001, Rev. 13

Table 5. Waste Transferred to ERDF.

Note that figures represent life-cycle totals for all 309 D4 activities, some of which began prior the current reporting year.

6.0 OCCUPATIONAL EXPOSURES

6.1 PERSONNEL INJURIES

During this reporting period, WCH D4 project personnel worked approximately 57,000 hours (manual and non-manual, including subcontractors) on the D4 of the 300 Area with two first aid cases, one Occupational Safety and Health Administration recordable injury, and no lost workday cases.

6.2 PERSONNEL RADIOLOGICAL EXPOSURES

For the D4 activities associated with the structures discussed in this document, one skin and no clothing contamination incidents occurred. There were no boundary air samples greater than airborne radioactivity area posting criteria. There were zero confirmed internal exposures of radioactive material.

During this reporting period, an estimated 188 person-mrem was received for all D4 activities in the 300 Area.

7.0 REFERENCES

- 20 CFR 1910, "Occupational Safety and Health Standards," Code of Federal Regulations, as amended.
- 40 CFR 68, "Chemical Accident Prevention Provisions," Code of Federal Regulations, as amended.
- Davis-Bacon Act of 1931, 40 U.S.C. 276a, et seq.
- D4-300-102, Facility Status Change Form, Facility ID: 309, U.S. Department of Energy, Richland Operations Office, Richland Washington. http://pdw.hanford.gov/pdf.cfm?accession=0081659H
- DOE/RL-2004-77, 2007, Removal Action Work Plan for 300 Area Facilities, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2010-34, 2013, Removal Action Work Plan for River Corridor General Decommissioning Activities, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE-STD-1027-92, 1997, DOE Standard Hazard Categorization and Accident Analysis

 Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports,
 Change Notice No. 1, U.S. Department of Energy, Washington, D.C.
- Ecology, EPA, and DOE, 1989, Hanford Federal Facility Agreement and Consent Order, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.
- IHC-2006-0013, 2011, "Initial Hazard Categorization (IHC) Documentation Plutonium Recycle Test Reactor (PRTR)," Rev. 1, Washington Closure Hanford, Richland, Washington.
- Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq., as amended.
- WCH-41, 2006, 300 Area D4 Project 1st Quarter Fiscal Year 2006 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-84, 2013, 300 Area Facilities D4 Environmental Control Plan, Rev. 2, Washington Closure Hanford, Richland, Washington.
- WCH-94, 2006, 300 Area D4 Project 2nd Quarter Fiscal Year 2006 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-116, 2006, 300 Area D4 Project 3rd Quarter Fiscal Year 2006 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-143, 2007, 300 Area D4 Project 4th Quarter Fiscal Year 2006 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.

- WCH-309, 2008, 300 Area D4 Project Fiscal Year 2007 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-310, 2008, 300 Area D4 Project Fiscal Year 2008 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-374, 2010, 300 Area D4 Project Fiscal Year 2009 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-447, 2011, 300 Area D4 Project Fiscal Year 2010 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-504, 2011, 300 Area D4 Project Fiscal Year 2011 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WCH-558, 2012, 300 Area D4 Project Fiscal Year 2012 Building Completion Report, Rev. 0, Washington Closure Hanford, Richland, Washington
- WCH-566, 2013, 300 Area D4 Project Fiscal Year 2013 Building Completion Report, Rev. 1, Washington Closure Hanford, Richland, Washington
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